

Lat 39.12779 Lon -120.67072

Evaluation of Annosus Root Disease in White Fir on Deadwood Ridge
Foresthill RD, Tahoe NF. Evaluation Number: NE98-11

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At the request of the Foresthill Ranger District, I evaluated a white fir stand for annosus root disease. On July 8, 1998, Gail Parn, District Silviculturist directed me to a small stand of white fir on Deadwood Ridge about 4.5 miles South of the Foresthill Divide Road in the SE corner of Section 19, T15N R12E.

The stand is approximately 5 acres and is stocked with mostly white fir and a few black oak. It is growing near the top of the ridge and is surrounded by a mixed conifer forest with a high percentage of ponderosa pine stocking. Annosus root disease is present throughout this small fir/oak stand. The stand is estimated to have an average diameter of 16" and an average height of 100'. Basal areas were measured up to 400 square feet per acre. Gail reports that there are other small stands in the mixed conifer forest to the southwest of this one with similar compositions of fir and oak.

About half of the stand is heavily infected with annosus root disease and the remainder has a lighter infestation as reflected by deadfall white fir. Conks of Heterobasidion annosum were found in fir stumps and many of the roots of windthrown fir had decay indicative of annosus root disease. At the center of the infestation, nearly half of the white fir are dead and many of these have fallen. The bark is off many of the fir trees revealing fir engraver bark beetle galleries. Most likely, the fir trees, stressed by root disease and drought, attracted the fir engraver which infested and killed them.

Moving south from the center of the infestation, the percentage of mortality and blowdown lessens to approximately 10% near the edge of the stand. At this point, we moved through manzanita and into a mixed conifer stand stocked with a high percentage of ponderosa pine. White fir, sugar pine, Douglas fir and incense cedar were also represented. Roots of windthrown white fir had annosus-like decay and fir engraver galleries were present on the boles.

Annosus root disease is present in white fir throughout the area. Elsewhere along the Foresthill Divide, this disease is commonly found infecting white fir. The heavy mortality in this stand is due in part to the concentration of host trees. In the surrounding forest, where white fir is a minor component the impact of the disease is far less. Other aggregations of pure white fir in the surrounding forest should be examined for heavy mortality in the fir. I am available to inspect such stands for root disease if they are detected by field crews.

Alternatives



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No Action:

In the absence of management, the annosus root disease will continue to infect the white fir roots. Many of the fir will not be killed by the disease because the disease primarily lives in the heartwood. The growth of the white fir will be reduced because of the disease. Infected trees will be less windfirm. When stressed by below-normal precipitation events, many infected fir will likely be killed by fir engraver infestation. Overstocked areas will sustain the highest mortality since they will experience the greatest stress. When openings are created by annosus related mortality and possible subsequent wildfire, ponderosa pine will seed in. Since pine is not susceptible to the fir-strain of annosus root disease, the stand will eventually become stocked more heavily with ponderosa pine.

Thin the white fir:

By thinning the white fir, more soil moisture and other site resources will be available for each remaining tree. Mortality will be reduced somewhat since the trees will be less stressed during drought. By thinning the stand, the fir component can be retained in the stand longer than if unthinned. The residual fir trees should attain larger heights and diameters. With the current high level of annosus infestation, white fir mortality will likely continue at a higher rate than in the surrounding mixed conifer forest. The fir with root disease will be more susceptible to windthrow than trees without root disease. Over time ponderosa pine can slowly regenerate in holes in the canopy created by fir mortality and possible subsequent wildfire. Movement of the stand to more ponderosa pine stocking should be slower than under no action.

Remove all the white fir in the infection center and plant ponderosa pine:

By removing all the white fir trees from the infection center, the disease should die out in 30 to 50 years. Ponderosa pine seedlings can be planted to replace the white fir since it will not be affected by the fir-strain of the annosus root disease. This is also true in the surrounding mixed conifer forest where the fir-strain of annosus root disease is infecting aggregations of true fir. By favoring pine as leave trees inside and outside the fir aggregations, there will be less impact from the fir-strain of annosus root disease on the forest. It is necessary to remember that it is wise to maintain a mix of different species of conifers in the forest where they existed historically. By doing this, the forest is less likely to be severely impacted by the outbreak of a single disease or insect infestation that effects one tree species. Although the pine-strain of annosus root disease is not prevalent in the area, it can easily become established if annosus spores infect freshly cut stumps. To minimize the threat of establishing pine-type annosus in the surrounding forest, it is wise to treat all freshly cut pine stumps, 12" and larger, with borax.

Further discussion:

If pure stands of annosus-infected white fir are found elsewhere in the Codfish Area, the same alternative actions will apply. Non-management, such as in the nearby spotted owl management area, can result in higher levels of annosus root disease in the white fir. This can slow tree growth, increase bark beetle related mortality, and reduce windfirmness in white fir. As a result the species composition should slowly move more heavily towards ponderosa pine as white fir die and pine seedlings become established in openings. At the same time fuel loadings will increase from the dead and down fir trees.

Silvicultural manipulation can speed up this process. By converting fir annosus centers to ponderosa pine and then controlling the stocking, large pine trees can be grown in a relatively short time to replace the diseased white fir. Without treatment, small fir in the disease centers will most likely never grow very large yet they will delay the establishment of ponderosa pine. Historically, natural wildfire probably limited the white fir component in this forest to a much lower level than is currently present. More white fir surviving to maturity in the forest may be partly responsible for the amount of annosus root disease present in the white fir on deadwood ridge.

Summary:

An annosus root disease center exists in the small stand of white fir on Deadwood Ridge. The disease is predisposing the trees to fir engraver attack during periods of drought. About half of the white fir near the center of the infestation and about ten percent near the fringes are dead. No treatment can result in reduced growth and continued mortality in the fir and a slow movement of the stand to more ponderosa pine. Thinning can increase growth rates and extend the longevity of individual white fir, but it will also subject diseased white fir to windthrow. The composition of the stand may move to more ponderosa pine at a slower rate than by not treating the stand. Removing all the fir in the annosus infection centers and replacing them with ponderosa pine can control the disease since the fir-strain of annosus root disease is not pathogenetic on pine. Large pine trees can be grown faster than if the root disease were allowed to run its natural course. Since annosus root disease is present in white fir in the surrounding mixed conifer forest, ponderosa pine should be favored for retention there. If fir aggregations with high mortality are found in the surrounding forest, FPM can examine them to detect root disease if needed.